# FIRE ANT MYRMECOPHILES: BREEDING PERIOD AND OVARIOLE NUMBER IN *MYRMECAPHODIUS EXCAVATICOLLIS* (BLANCHARD) AND *EUPARIA CASTANEA* SERVILLE (COLEOPTERA: SCARABAEIDAE)[1]

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## Abstract

Dissection of female *Myrmecaphodius excavaticollis* (Blanchard) and *Euparia castanea* Serville from black light collections indicated that both species flew in all stages of ovarian development. Dissection of beetles collected from light traps, ant mounds, pitfall traps, and on top of ant mounds suggested that *M. excavaticollis* may breed continuously during the year. The maximum number of mature eggs found in *M. excavaticollis* was 26, with most specimens containing 12 or fewer. Dissection of *E. castanea* collected from ant mounds and light traps indicated that this species too may breed continuously throughout the year. The maximum number of eggs observed in *E. castanea* was 18. There were 6 ovarioles per ovary in both species.

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Determination of breeding periods by dissection of specimens collected over a period of time has been done extensively with Carabidae (Barlow 1970, Luff 1973, Rivard 1964) and with a few Scarabaeidae (Bedford 1975, Gruner 1973, Habeck 1964, Milne 1959). Gruner (1973) grouped dissected *Phyllophaga pleei* Blanchard (Scarabaeidae) into 3 categories: (1) young (oocytes undeveloped), (2) oocytes mature, and (3) oocytes produced (spent).

Ritcher and Baker (1974) surveyed ovariole numbers in 18 species of Aphodiinae (Scarabaeidae) and found that they ranged from 2 to 7 per ovary depending on the species. The ovariole numbers of *Myrmecaphodius excavaticollis* (Blanchard) and *Euparia castanea* Serville have not been reported in the literature and the breeding periods of these widespread myrmecophilous beetles (Wojcik *et al.* 1977) have not been studied.

As part of a larger study of the biology of these beetles, we investigated the breeding periods and ovariole numbers.

## Materials and Methods

The breeding periods of *E. castanea* and *M. excavaticollis* were studied by dissecting female beetles that had been preserved in 70% isopropanol.

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All available *E. castanea* females were dissected, but the numbers were insufficient for a complete evaluation. The dissected *M. excavaticollis* included females from ant mounds, pitfall traps, and Gainesville light trap collections (Wojcik 1975).

Beetles were dissected by removing the abdomen and peeling back the abdominal tergites with fine forceps. Gut tissue was carefully teased away to expose the ovaries. In sufficiently preserved specimens, the ovarioles and eggs were counted, and the ovariole status was evaluated. Ovaries were classified into 3 categories: (1) immature ovaries (no eggs visible), (2) ovaries with visible eggs (gravid), and (3) spent ovaries (eggs produced). *E. castanea* is always reddish-brown in color, but *M. excavaticollis,* depending on age, is bright redbrown to almost black in category 1. The ovaries of the bright red-brown specimens were always very small and undeveloped; the ovarioles were fused together, and no eggs were present. The ovaries of darker specimens were larger. *M. excavaticollis* in category 2 were always black, with large ovaries, containing small to mature eggs. The ovarioles were separated in the later stages of egg development, facilitating ovariole counts. *M. excavaticollis* were always black in category 3 and had large ovaries with the ovarioles separated, but no eggs were present. If adequately preserved, the oviducts were stretched and flacid looking.

## Results and Discussion

Seventeen specimens of *E. castanea* collected from ant mounds in Florida were available for dissection. These had been collected as follows: January (3 specimens), February (2), March (1), April (7), May (1), June (2), and October (1). One beetle collected in March and 1 in May contained fully developed eggs. Only 1 specimen (from October) had no eggs, with the ovaries disintegrated and the median oviduct enlarged. The remaining 14 individuals had their ovarioles fused together with small to medium sized eggs present. Two of 3 specimens of *E. castanea* from September light trap collections had small oviducts with their ovarioles fused together with small to medium sized eggs present. The third specimen contained no eggs or ovarioles with the ovaries resembling large loose bags. The median oviduct was greatly enlarged. The maximum number of eggs observed in this species was 18.

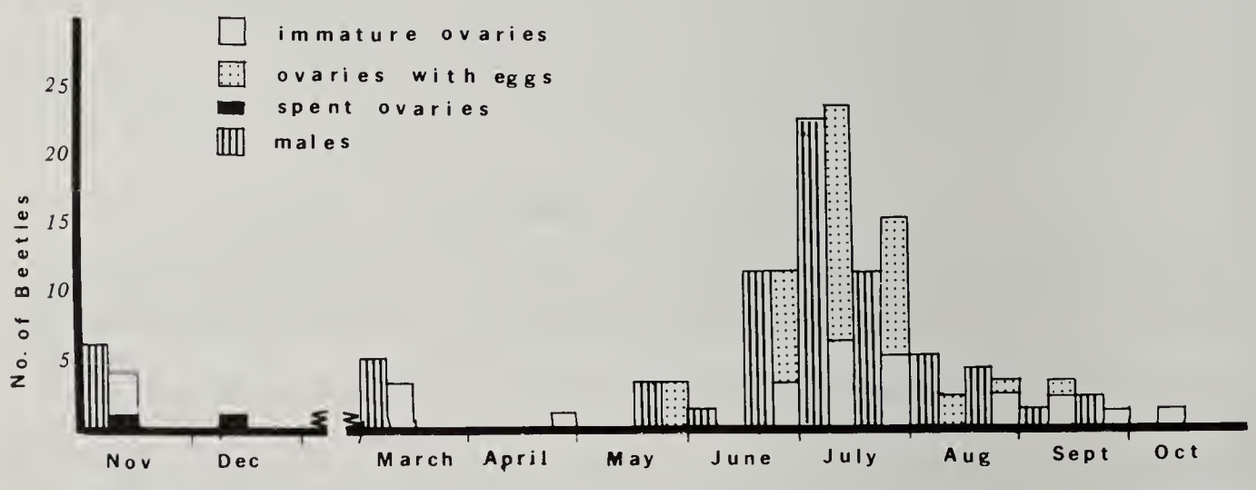


Fig. 1. Numbers of *M. excavaticollis* and reproductive status of females collected in the Gainesville black light trap in semi-monthly intervals.

The results of the dissections of *M. excavaticollis* collected in the Gainesville black light trap are shown in Fig. 1. Beetles with immature ovaries flew year round. Beetles with immature eggs flew from May until September. Two beetles with mature eggs were collected in June and 5 in July. Spent ovaries were found in 1 beetle in November and 1 in December.

Forty-seven beetles that were dissected were collected from ant mounds in Florida as follows: January (8 specimens), February (5), March (3), April (2), May (12), June (10), September (3), and November (4). Of these 47 specimens, 45 were gravid. Thirteen of the gravid specimens contained mature eggs and were collected as follows: February (1 specimen), March (1), May (3), and June (8). One specimen in March and 1 in September contained immature ovaries.

Eight specimens were available from pitfall collections from Georgia and Florida from May (6 specimens), September (1), and November (1). Three of the May specimens contained large mature eggs, and 3 contained smaller immature eggs. The September and November specimens contained immature ovaries.

Seven specimens, collected on top of ant mounds in Florida in July (1) and September (6), were dissected. The July specimen and 2 of the September specimens contained mature eggs. A third September specimen contained immature eggs, and the remaining 3 specimens contained immature ovaries.

The amount of fat body present was not measured, but some general observations were made. Females with large mature eggs usually contained little fat body. Beetles collected from light traps contained much less fat body than those collected from ant mounds, which is in accord with the report of Milne (1959) on the utilization of fat body by *Phyllopertha horticola* (L.). He stated that beetles collected after their initial emergence flight contained less than 50% of their original fat body and had essentially none at the completion of egg deposition.

Other scarabs have been reported to fly during all stages of ovarian development (Bedford 1975, Gruner 1973, Habeck 1964, Milne 1959). All of these reports, however, have to do with plant feeding species, which are usually single brooded. From the status of the ovaries examined in this study, *M. excavaticollis* breeds continuously since gravid beetles were collected from ant mounds and light traps throughout most of the year. (Larvae have been collected from ant mounds during most of the year and are most common in late summer and early fall, Wojcik and Woodruff unpubl.). The adult beetles are apparently long lived. One specimen field-collected as an adult lived 159 days (October to March) in the laboratory (Wojcik and Woodruff unpubl.). Gravid scarab beetles and those with immature ovaries are not usually attracted to black light traps (Habeck 1964); *M. excavaticollis* and *E. castanea* are unusual in this respect.

We were not able to discern corpora lutea in the 2 species studied. Gruner (1973) found corpora lutea in the scarab beetle he studied. If it can be shown that corpora lutea are present, the number of generations per year and the maximum number of eggs produced by each female may be resolved.

The maximum number of mature eggs found in *M. excavaticollis* was 26 (1 specimen). The other beetles examined had 12 or fewer mature eggs. All ovarioles in an ovary apparently do not develop at the same rate. There appeared to be continuous development of eggs, since females were found with ovarioles containing eggs of different sizes.

We made ovariole counts for 3 *E. castanea* and 41 *M. excavaticollis,* and 6 ovarioles were found in each ovary. This contrasts with the 3 ovarioles per ovary in *Ataenius cognatus* (LeConte) and *A. deserta* Horn which were used by Ritcher and Baker (1974) to represent the tribe Eupariini.

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